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# Monitoring Plan for Selected Pesticides in the Sacramento and San Joaquin River Basins and the Sacramento-San Joaquin Delta During Irrigation Season 2007

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## I. INTRODUCTION

In accordance with Clean Water Act Section 303(d), all states must identify "impaired" bodies of water and establish Total Maximum Daily Loads (TMDLs) for stressors that are the cause of the impairment. States must also develop monitoring and control plans for each stressor. In California, the State Water Resources Control Board and its nine subunits, the Regional Water Quality Control Boards (RWQCBs), are responsible for meeting section 303(d) requirements.

Since January 2003 the Aquatic Ecosystems Analysis Laboratory (AEAL) has performed the organophosphate pesticide water quality objective (WQO) and TMDL compliance monitoring for the Central Valley RWQCB in the Sacramento and San Joaquin river basins and the Delta. In 2007 some TMDL compliance monitoring will be performed by the Sacramento Valley Water Quality Coalition and the San Joaquin County and Delta Water Quality Coalition.

In 2007, AEAL will perform exploratory monitoring in agricultural and urban areas in addition to organophosphate TMDL compliance monitoring at one site in the San Joaquin Basin (the San Joaquin River at Crows Landing). The purpose of this monitoring is to characterize water quality risks from pesticides that have been identified as "potential high risk" to surface waters as determined by their chemical properties and usage (Lu 2005).

This document describes the sampling plan to identify and characterize the presence of potential high risk pesticides within urban and agricultural areas and to investigate the concentrations of organophosphate pesticides for TMDL compliance monitoring within surface waters of the Central Valley.

## II. OBJECTIVES

The primary objectives of this sampling project are (1) to measure the concentrations of potential high risk pesticides within selected surface agricultural and urban waters of the Central Valley, and (2) to characterize organophosphorus pesticides at a TMDL compliance site on the San Joaquin River at Crows Landing. The objectives will be achieved via the following tasks:

- Sampling three sites in the Sacramento Basin, two sites in the San Joaquin Basin and two sites in the Delta for selected herbicides once per week for four weeks in April 2007.
- Sampling seven sites in the Sacramento Basin, two sites in the San Joaquin Basin and two sites in the Delta once per week for four weeks in July 2007.
- Sampling two streams in the city of Sacramento and one stream in the city of Stockton once per week for two weeks in April and two weeks in July for selected organophosphates, carbamates, herbicides, triazines and fipronil entering from urban sources.

- Sampling the San Joaquin River at Crow's Landing for selected organophosphate pesticides once per week for two weeks in April and two weeks in July 2007.

## III. PERSONNEL

Sample collection will be performed by the Aquatic Ecosystems Analysis Laboratory (AEAL) of University of California, Davis under Contract No. 06-262-150-0 with the Central Valley Regional Water Quality Control Board (CVRWQCB). The California Department of Fish and Game (CDFG) will perform the sample analysis in their Fish and Wildlife Water Pollution Control Laboratory in Rancho Cordova, CA. The primary project personnel include a contract manager and a technical reviewer from the CVRWQCB, and a project manager and project supervisor from UC Davis.

**Petra Lee (CVRWQCB) - Contract Manager:** The contract manager is responsible for obtaining all services and analytical results/reports from the CDFG Analysis Lab contractor. **Technical Reviewer:** Technical Reviewer provides advice in determining the sampling sites, frequency, and time periods and the Technical Reviewer is responsible for overseeing budgetary expenses related to this monitoring study.

**Dr. Michael Johnson (UCD) - Project manager:** The project manager will work directly with CVRWQCB monitoring staff to provide guidance on site selection and timing of sample collection. The project manager will also inform monitoring staff about sample collection and sample transport to the analytical laboratory; obtain a copy of all Chain of Custody (COC) records after each sampling day; receive the chemical analysis results from CDFG lab contract manager; and prepare a monitoring program report including lab analysis results.

**Henry Calanchini (AEAL) – Project Supervisor:** The project supervisor will assist the project manager by hiring, training, and supervising all monitoring staff and contributing to the monitoring program report. The project supervisor will be responsible for sample collection and transport to the analytical lab, database entry of sample results, coordinating quality control checks of data entry with the AEAL quality assurance officer and assisting the project manager with preparation of the final report.

**Field Technicians:** Henry Calanchini and Anja Wehrmann

## IV. MONITORING SITES

The monitoring sites for this study are listed in Table 1 and shown in Figures 1-4. Schedules of sample collection are listed in Appendix A.

Table 1. The 2007 Pesticide Monitoring Sites in the Sacramento and San Joaquin Basins and Delta.

| ***Site ID*** | ***Site Name*** | ***Latitude*** | ***Longitude*** |
|---|---|---|---|
| 520LSAC31 | Colusa Basin Drain #1 | 38.8125 | -121.7731 |
| 520LSAC30 | Freshwater Creek at Old Hwy 99 West | 39.1773 | -122.1612 |
| 520KRCN16 | Knight's Landing Ridge Cut at Road 16 North | 38.7486 | -121.6933 |
| 541STC040 | Ingram Creek at River Road | 37.6003 | -121.2242 |
| 531SJC503 | Lone Tree Creek at Austin Road | 37.8557 | -121.1841 |
| 544PCPR01 | Paradise Cut at Paradise Road | 37.7998 | -121.3694 |
| 541STC019 | Orestimba Creek at River Road | 37.4144 | -121.0138 |
| 520LSAC24 | Live Oak Slough at Nuestro Road | 39.1853 | -121.6615 |
| 520SCAMRD | Sand Creek at Miller Road | 39.0676 | -122.0227 |
| 520LSAC27 | Little Dry Creek at Afton Road | 39.4206 | -121.8527 |
| 520LSAC28 | Butte Creek at Afton Road | 39.4199 | -121.8800 |
| 520LSAC29 | Stone Corral Creek at Four Mile Road | 39.2935 | -122.1167 |
| 535STC504 | San Joaquin River at Crow's Landing | 37.4326 | -121.0134 |
| 519CRSSAP | Chicken Ranch Slough at Santa Anita Park | 38.6080 | -121.4057\ |
| 519SRSCP1 | Strong Ranch Slough at Cottage Park | 38.6041 | -121.3926 |
| 544MCTR01 | Mosher Creek at Thornton Road | 38.0283 | -121.3319 |

Figure 1. The eight sampling sites in the Sacramento River Basin to be monitored for pesticides during the 2007 spring-summer irrigation season.

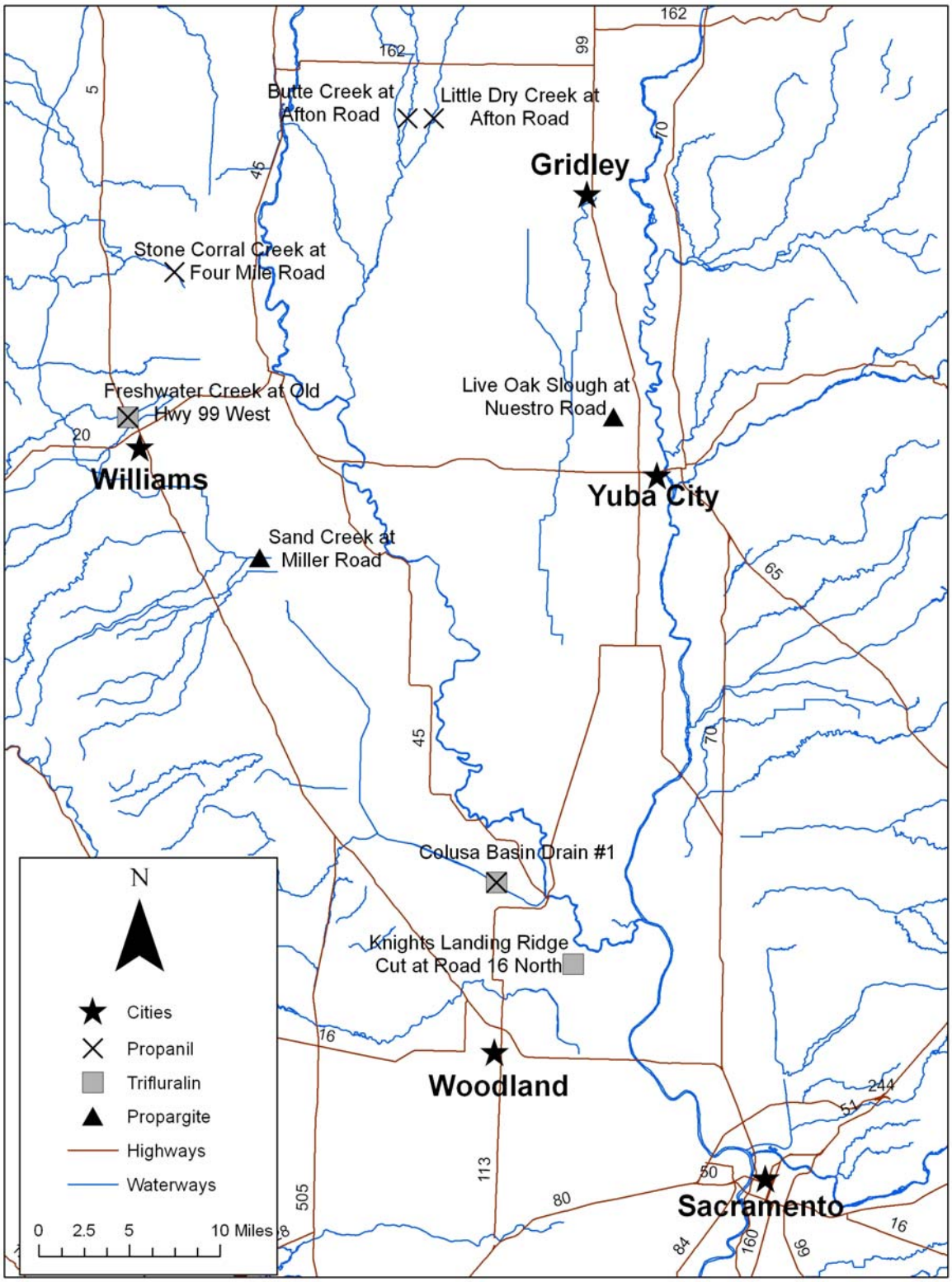


Figure 2. The five sampling sites in the San Joaquin River Basin and Delta to be monitored for pesticides during the 2007 spring-summer irrigation season.

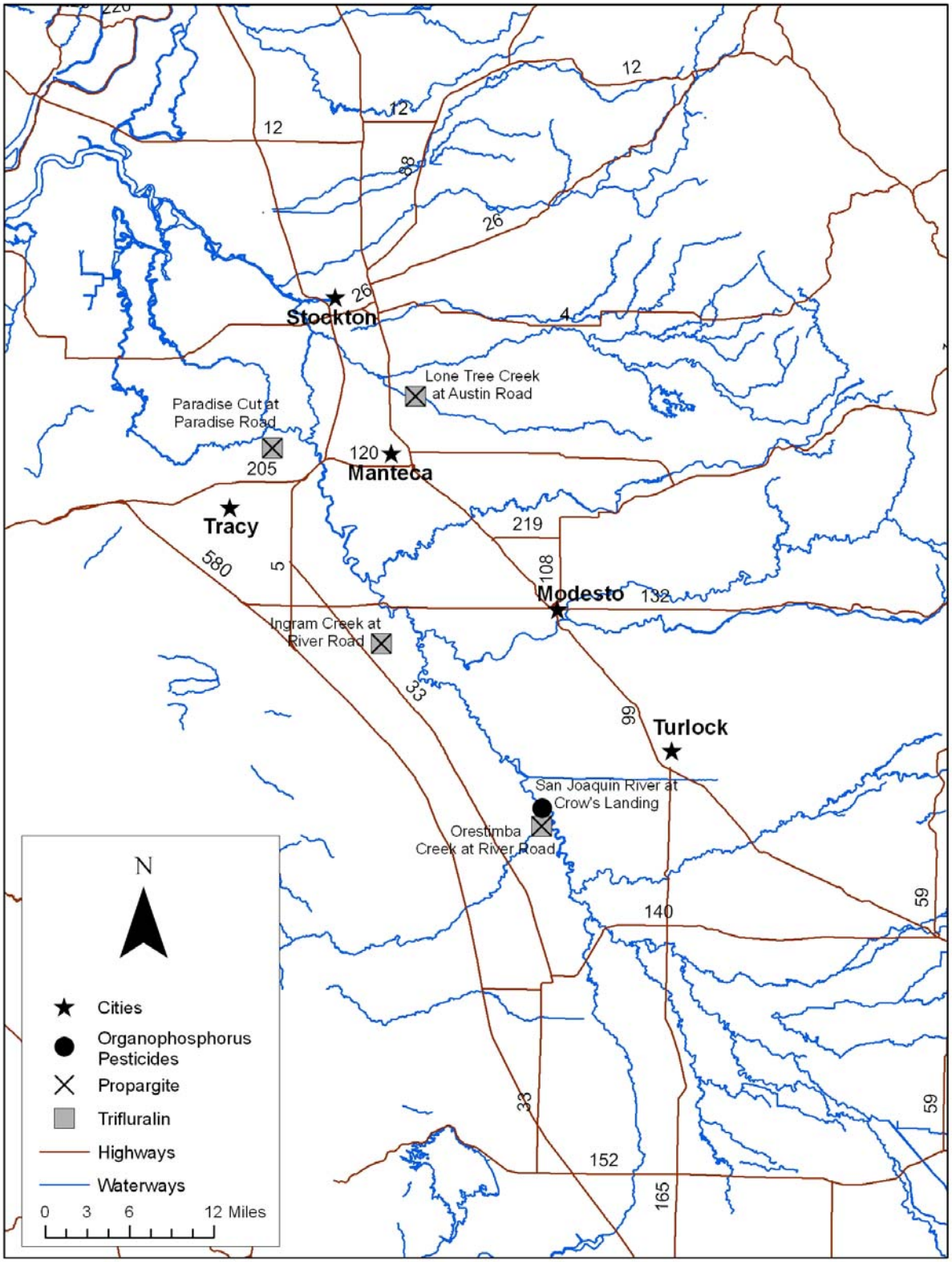


Figure 3. The two urban sampling sites in the Sacramento metropolitan area to be monitored for pesticides during the 2007 spring and summer season.

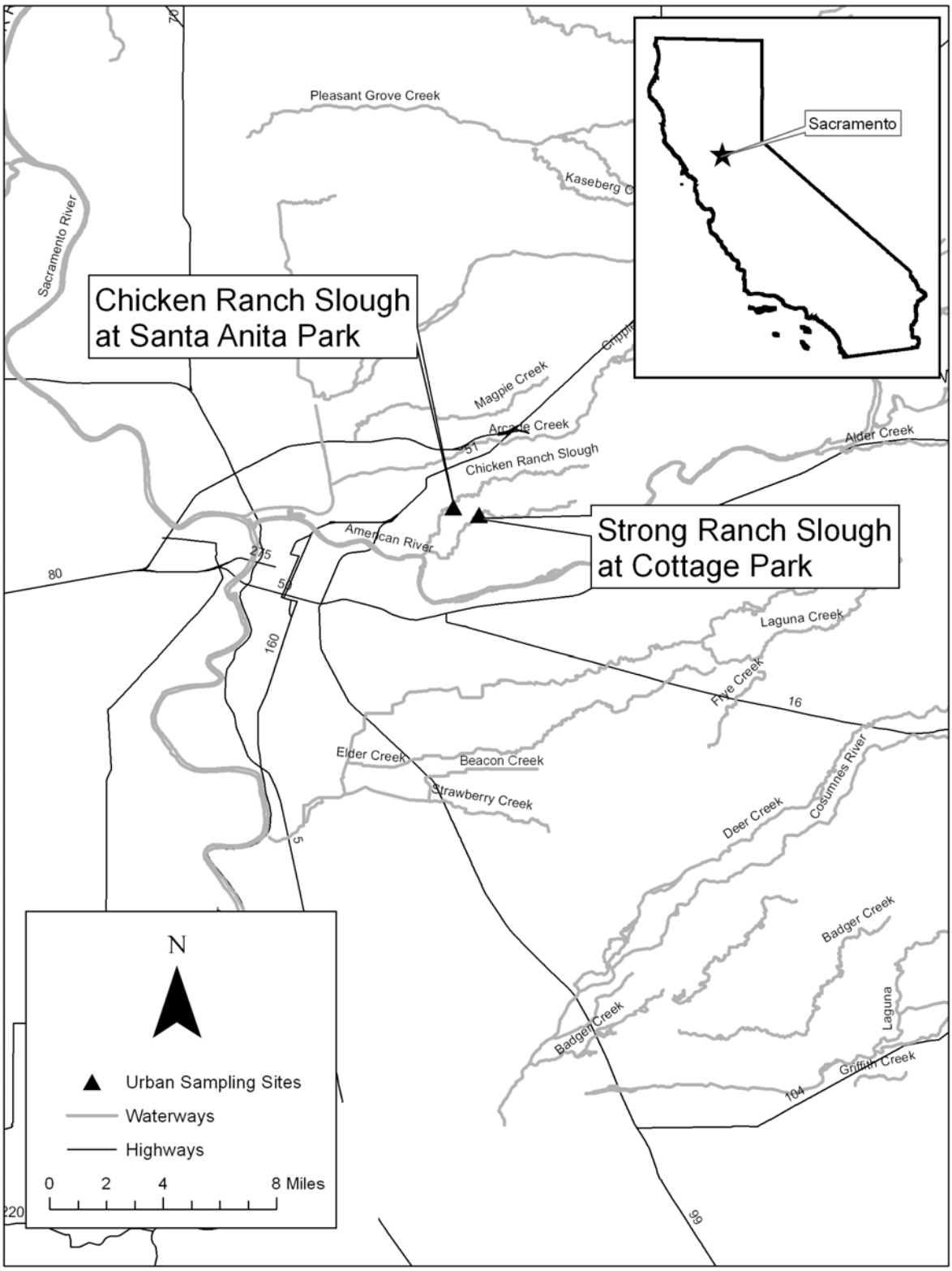
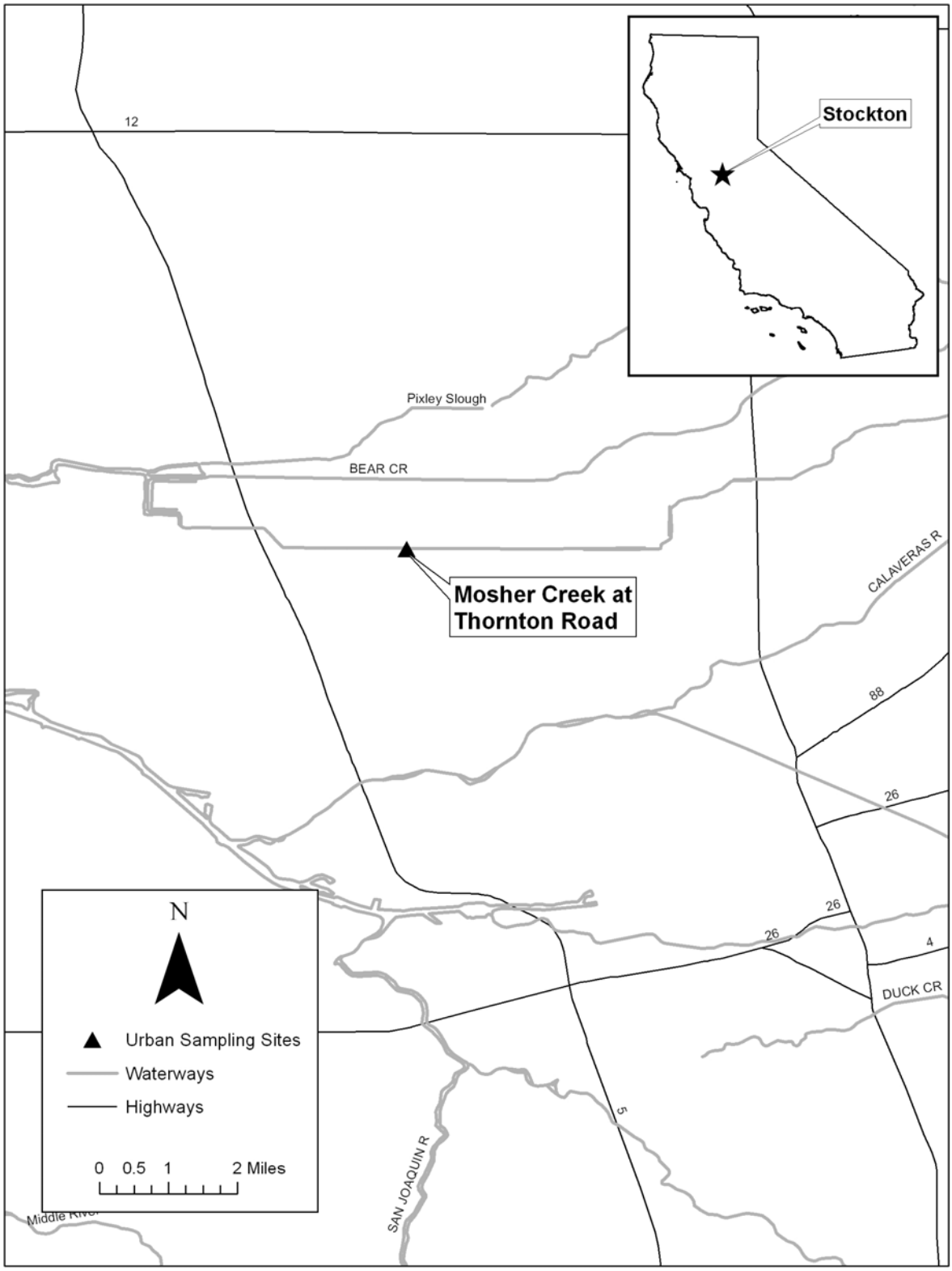


Figure 4. The urban sampling site in the Stockton area to be monitored for pesticides during the 2007 spring and summer season.



## V. SAMPLE and DATA COLLECTION

The samples at Colusa Basin Drain #1, Knight's Landing Ridge Cut, Paradise Cut and Butte Creek at Afton Road will be collected by lowering a 3-L Teflon® bottle from a bridge at three equally spaced intervals. The 3-L bottle will be lowered from the water surface to the streambed and back at a uniform rate consistent with filling the bottle ¼ full at each vertical. After collecting the third vertical the Teflon® bottle will be capped and the water agitated to ensure thorough mixing before the water is poured into a 1-L amber glass sample bottle. Samples at all other sites will be collected by strapping a 1-L amber glass sample bottle into a PVC pole sampler and dipping the bottle as close to the center of the channel as possible until the bottle is full.

Each sample will be marked on the field sheet as either a "grab" sample if it is collected with a single dip of the pole sampler, or as an "integrated grab" sample if it is collected with the 3-L Teflon® bottle from two or more verticals across the stream channel width and mixed together to form a composite sample. If, at any site, the sampler does not believe the stream water to be well mixed the 3-L Teflon® bottle will be used to collect a composite sample by partially filling the bottle at each of three or more verticals, agitating the composite sample and pouring the water into a 1-L amber glass sample bottle. The number of verticals will be recorded on the field sheet.

Field duplicate samples will be collected simultaneously using a pole sampler that holds two 1-liter amber glass bottles, or, at sites where a 3-L Teflon® bottle is used to collect the primary sample, a second aliquot will be poured from the composite sample and analyzed as a duplicate. Matrix spike (MS) and matrix spike duplicate (MSD) samples will be collected in the same manner as duplicate samples but separate from and immediately after the collection of the primary sample. Field blanks will consist of deionized water poured directly into the sample bottle at sites where grab samples are scheduled or, processed through the 3-L Teflon® bottle and then into the 1-liter amber glass bottle at sites where a composite sample is scheduled.

All samples will be placed in a cooler on wet ice and stored at 4°C until delivered to the analytical lab. If samples cannot be delivered on the day of collection they will be delivered the following morning. A chain of Custody (COC) form listing each sample will be completed. The analyzing laboratory will retain custody of the original COC and provide a copy to the AEAL for their records. The AEAL will provide copies of all COCs to the CVRWQCB.

At each site the following data will be measured (or observed) and recorded: *in-situ* measurements of water quality parameters (pH, temperature, specific conductance), weather conditions, stream conditions, approximate location in the stream at which the sample was collected and any pertinent observations (inputs, dead fish, etc). For specific procedures refer to Appendix B: Standard Operating Procedures for Collecting Surface Water Samples in Central Valley Waterways.

## VI. CHEMICAL ANALYSIS

Chemical analyses will be performed by the California Department of Fish and Game's Fish and Wildlife Water Pollution Control Laboratory. Water samples will be analyzed for organophosphates, carbamates, herbicides, triazines and fipronil using the GC-FPD, HPLC-MS, GC-MSMS and GC/TDS methods (Appendices D-F). Table 2 presents the pesticides to be analyzed, the chemical analytical methods, and reporting limits.

Table 2. List of pesticides to be analyzed for in surface waters of the Sacramento and San Joaquin basins and Delta.

(GC-FPD: Gas Chromatography – Flame Photometric Detector ; GC-MSMS: Gas Chromatography – Tandem Mass Spectrometry; GC/TSD: Gas Chromatography/Thermionic Bead Specific Detector; HPLC-MS: High Performance Liquid Chromatography – Mass Spectrometry)

| Class/Method | Analyte | Method Detection Limit (ppb) | Reporting Limit (ppb) |
|---|---|---|---|
| Organophosphates | azinphos methyl | 0.030 | 0.050 |
| GC-FPD | chlorpyrifos | 0.003 | 0.005 |
| | diazinon | 0.003 | 0.005 |
| | malathion | 0.030 | 0.050 |
| | methidathion | 0.030 | 0.050 |
| | methyl parathion | 0.010 | 0.050 |
| | | | |
| Carbamates | aldicarb | 0.010 | 0.020 |
| HPLC-MS | carbaryl | 0.010 | 0.020 |
| | carbofuran | 0.010 | 0.020 |
| | captan | 0.050 | 0.100 |
| | diuron | 0.002 | 0.005 |
| | linuron | 0.002 | 0.005 |
| | methiocarb | 0.150 | 0.250 |
| | methomyl | 0.010 | 0.020 |
| | | | |
| Herbicides | oxyfluorfen | 0.020 | 0.050 |
| GC-MSMS | propanil | 0.050 | 0.100 |
| | propargite | 0.200 | 0.500 |
| | trifluralin | 0.050 | 0.100 |
| | | | |
| Triazines | ametryn | 0.020 | 0.050 |
| GC/TSD | atraton | 0.020 | 0.050 |
| | atrazine | 0.020 | 0.050 |
| | prometon | 0.020 | 0.050 |
| | prometryn | 0.020 | 0.050 |
| | propazine | 0.020 | 0.050 |
| | secbumeton | 0.020 | 0.050 |
| | simazine | 0.020 | 0.050 |
| | simetryn | 0.020 | 0.050 |
| | terbuthylazine | 0.020 | 0.050 |
| | terbutryn | 0.020 | 0.050 |
| | | | |
| Phenylpyrazole | fipronil | 0.050 | 0.100 |
| GC/TSD | | | |
| | | | |

## VII. QUALITY ASSURANCE/QUALITY CONTROL

Quality control will be conducted in accordance with the methods outlined in Appendix B: Standard Operating Procedures for Collecting Surface Water Samples in Central Valley Waterways. Quality control samples will consist of field blanks (n=7), field duplicates (n=7), matrix spikes (n=28) and matrix spike duplicates (n=28). The total number of field blanks and field duplicates are equal to approximately 10% of the total number of primary samples (n=136). The matrix spike and matrix spike duplicate samples are collected at the rate of one pair per batch of 20 or fewer samples. Quality control samples will be spread as evenly as possible among the various constituents, sites and sampling months. See Appendix A for schedules of quality control samples.

## VIII. DATA REPORT

One data report will be produced. The final data report will summarize the activities conducted to generate the data including sample collection, storage, and analysis. The data report will include tables of all analytical results, including quality control samples, and an assessment of the overall quality of the data generated in comparison to the goals described in the Quality Assurance Project Plan (QAPP). A preliminary draft of the data report should be submitted to the CVRWQCB by September 21, 2007. Following a review period of no longer than two (2) weeks, Regional Board staff will submit any comments they have on the preliminary drafts. The monitoring report will be finalized by October 19, 2007.

## IX. TIME TABLE

Field Sampling: April and July 2007
Chemical Analysis: Results to be supplied within four weeks of sample delivery
Draft report: to CVRWQCB by September 21, 2007; finalized by October 19, 2007.

## X. REFERENCES

Lu, Z., G. Davis and J. Karkoski. 2005. Relative Risk Assessment for Pesticides Used in the Sacramento River Watershed. Draft report. Regional Water Quality Control Board, Central Valley Region.

# Appendix A

## Schedules of Primary and Quality Control Samples

| Analyses Key |
|---|
| A) Organophosphates by GC-FPD "Short List" (chlorpyrifos, diazinon, azinphos methyl, malathion, methidathion, methyl parathion) |
| B) Triazines by GC/TSD (ametryn, atraton, atrazine, prometon, prometryn, propazine, secbumeton, simazine, simetryn, terbuthylazine, terbutryn) |
| C) Carbamates by LC-MS (diuron, carbofuran, carbaryl, methiocarb, aldicarb, captan, linuron, methomyl) |
| D) Herbicides by GC-MSMS (propanil, propargite, oxyfluorfen, trifluralin) |
| E) Fipronil by GC/TSD |

| Primary and Quality Control (QC) Sample Schedule for the April 2007 Irrigation Sampling | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Colusa Basin Drain #1**<br>520LSAC31 | | **Freshwater Creek at Old Hwy 99 West**<br>520LSAC30 | | **Knights Landing Ridge Cut at Road 16 North**<br>520KRCN16 | | **Ingram Creek at River Road**<br>541STC040 | |
| | Primary | QC | Primary | QC | Primary | QC | Primary | QC |
| **April 5** | D | EB | D | | D | | D | MS/MSD |
| **April 12** | D | | D | | D | DP | D | |
| **April 19** | D | | D | | D | | D | |
| **April 26** | D | | D | | D | | D | |
| | | | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | | EB: Environmental Blank | | | DP: Field Duplicate | |

| Primary and Quality Control (QC) Sample Schedule for the April 2007 Irrigation Sampling | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Lone Tree Creek at Austin Road**<br>531SJC503 | | **Paradise Cut at Paradise Road**<br>544PCPR01 | | **Orestimba Creek at River Road**<br>541STC019 | | **San Joaquin River at Crows Landing**<br>535STC504 | |
| | Primary | QC | Primary | QC | Primary | QC | Primary | QC |
| **April 5** | D | | D | DP | D | | A | MS/MSD, EB, DP |
| **April 12** | D | EB | D | | D | MS/MSD | A | MS/MSD |
| **April 19** | D | | D | MS/MSD | D | | | |
| **April 26** | D | MS/MSD | D | | D | | | |
| | | | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | | EB: Environmental Blank | | | DP: Field Duplicate | |

| Analyses Key |
|---|
| A) Organophosphates by GC-FPD "Short List" (chlorpyrifos, diazinon, azinphos methyl, malathion, methidathion, methyl parathion) |
| B) Triazines by GC/TSD (ametryn, atraton, atrazine, prometon, prometryn, propazine, secbumeton, simazine, simetryn, terbuthylazine, terbutryn) |
| C) Carbamates by LC-MS (diuron, carbofuran, carbaryl, methiocarb, aldicarb, captan, linuron, methomyl) |
| D) Herbicides by GC-MSMS (propanil, propargite, oxyfluorfen, trifluralin) |
| E) Fipronil |

**Primary and Quality Control (QC) Sample Schedule for the April 2007 Urban Influences Sampling**

| | **Mosher Creek at Thornton Road** 544MCTR01 | | **Chicken Ranch Slough at Santa Anita Park** 519CRSSAP | | **Strong Ranch Slough at Cottage Park** 519SRSCP1 | |
|---|---|---|---|---|---|---|
| | Primary | QC | Primary | QC | Primary | QC |
| **April 5** | | | | | | |
| **April 12** | | | | | | |
| **April 19** | A,B,C,D,E | | A,B,C,D,E | MS/MSD (C,E) | A,B,C,D,E | MS/MSD (A,B) |
| **April 26** | A,B,C,D,E | | A,B,C,D,E | MS/MSD (A,B) | A,B,C,D,E | MS/MSD (C,E) |
| | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | EB: Environmental Blank | | DP: Field Duplicate | |

| Analyses Key |
|---|
| A) Organophosphates by GC-FPD "Short List" (chlorpyrifos, diazinon, azinphos methyl, malathion, methidathion, methyl parathion) |
| B) Triazines by GC/TSD (ametryn, atraton, atrazine, prometon, prometryn, propazine, secbumeton, simazine, simetryn, terbuthylazine, terbutryn) |
| C) Carbamates by LC-MS (diuron, carbofuran, carbaryl, methiocarb, aldicarb, captan, linuron, methomyl) |
| D) Herbicides by GC-MSMS (propanil, propargite, oxyfluorfen, trifluralin) |
| E) Fipronil |

| Primary and Quality Control (QC) Sample Schedule for the July 2007 Irrigation Sampling | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Live Oak Slough at Nuestro Road** 520LSAC24 | | **Sand Creek at Miller Road** 520SCAMRD | | **Little Dry Creek at Afton Road** 520LSAC27 | | **Butte Creek at Afton Road** 520LSAC28 | |
| | Primary | QC | Primary | QC | Primary | QC | Primary | QC |
| **July 5** | D | | D | | D | MS/MSD | D | EB |
| **July 12** | D | | D | MS/MSD | D | EB | D | |
| **July 19** | D | | D | | D | | D | |
| **July 26** | D | | D | | D | | D | |
| | | | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | | EB: Environmental Blank | | | DP: Field Duplicate | |

| Primary and Quality Control (QC) Sample Schedule for the July 2007 Irrigation Sampling | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Stone Corral Creek at Four Mile Road/Excelsior Road** 520LSAC29 | | **Freshwater Creek at Old Hwy 99 West** 520LSAC30 | | **Colusa Basin Drain #1** 520LSAC31 | | **Ingram Creek at River Road** 541STC040 | |
| | Primary | QC | Primary | QC | Primary | QC | Primary | QC |
| **July 5** | D | | D | | D | | D | |
| **July 12** | D | | D | | D | | D | |
| **July 19** | D | | D | | D | | D | EB |
| **July 26** | D | MS/MSD | D | EB | D | | D | |
| | | | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | | EB: Environmental Blank | | | DP: Field Duplicate | |

| Analyses Key |
|---|
| A) Organophosphates by GC-FPD "Short List" (chlorpyrifos, diazinon, azinphos methyl, malathion, methidathion, methyl parathion) |
| B) Triazines by GC/TSD (ametryn, atraton, atrazine, prometon, prometryn, propazine, secbumeton, simazine, simetryn, terbuthylazine, terbutryn) |
| C) Carbamates by LC-MS (diuron, carbofuran, carbaryl, methiocarb, aldicarb, captan, linuron, methomyl) |
| D) Herbicides by GC-MSMS (propanil, propargite, oxyfluorfen, trifluralin) |
| E) Fipronil |

**Primary and Quality Control (QC) Sample Schedule for the July 2007 Irrigation Sampling**

| | **Lone Tree Creek at Austin Road** 531SJC503 | | **Paradise Cut at Paradise Road** 544PCPR01 | | **Orestimba Creek at River Road** 541STC019 | | **San Joaquin River at Crows Landing** 535STC504 | |
|---|---|---|---|---|---|---|---|---|
| | Primary | QC | Primary | QC | Primary | QC | Primary | QC |
| **July 5** | D | | D | | D | | | |
| **July 12** | D | | D | | D | | | |
| **July 19** | D | DP | D | | D | MS/MSD | A | MS/MSD |
| **July 26** | D | | D | | D | | A | MS/MSD, DP |
| | | | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | | EB: Environmental Blank | | | DP: Field Duplicate | |

**Primary and Quality Control (QC) Sample Schedule for the July 2007 Urban Influences Sampling**

| | **Mosher Creek at Thornton Road** 544MCTR01 | | **Chicken Ranch Slough at Santa Anita Park** 519CRSSAP | | **Strong Ranch Slough at Cottage Park** 519SRSCP1 | |
|---|---|---|---|---|---|---|
| | Primary | QC | Primary | QC | Primary | QC |
| **July 5** | A,B,C,D,E | MS/MSD (A,B) | A,B,C,D,E | MS/MSD (C,E) | A,B,C,D,E | DP (E) |
| **July 12** | A,B,C,D,E | MS/MSD (C,E) | A,B,C,D,E | MS/MSD (A,B) | A,B,C,D,E | DP (C) |
| **July 19** | | | | | | |
| **July 26** | | | | | | |
| | | | | | | |
| MS/MSD: Matrix Spike/Matrix Spike Duplicate | | | EB: Environmental Blank | | DP: Field Duplicate | |

# Appendix B

# Standard Operating Procedures for Collecting Surface Water Samples in Central Valley Waterways

Aquatic Ecosystems Analysis Laboratory
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# Standard Operating Procedures for Collecting Surface Water Samples in Central Valley Waterways

## 1. Labeling the sample bottle

- Use pre-printed labels for each site. The label should include the site name, ID number, date, sample time, and your initials
- Complete the printed label with an extra-fine-point Sharpie. Cover the entire label with a piece of clear tape to prevent peeling
- Use 24-hour military time for the sample time; round to the nearest 10 minutes. For example: a sample collected at 09:52 would have the sample time on the label and Chain of Custody (COC) form rounded off to 09:50; a sample collected at 09:57 would be rounded up to 10:00; 09:55 would also be rounded up to 10:00. Use the following format for the date: mm/dd/yy

Sacramento River at Freeport
Date__01/10/06_____
Time_10:50__Initials_HJC__
I.D. 519SAC502

## 2. Check the Quality Control Schedule to see if a QC sample is scheduled for the site

If so, label an additional 1L amber glass bottle according to the instructions in Step 5 below. Read the QC sampling procedure before sampling.

## 3. Fill out Field Sheet at each sampling site

**How to fill out a field sheet:**

Sampling Information

- Sampling Type is already filled out. Add sampler initials
- Sampler Bottle: 1L amber bottles are glass, 3L bottles are made of Teflon®
- Sampling Method: vertical integrated grab is from a bridge, grab is from the bank

- Stage: will become apparent with experience, also can be researched later on the web or read from a staff gage if present

**Sample Collected**

- If a quality control sample is scheduled, place a check beside type of sample
- Sampling Time: Record rounded sample time

**Field Measurements**

Use Oakton pH/conductivity/temp meters; allow the probe to soak in native water for a few minutes for the reading to stabilize. Note the values for temperature, pH and EC on the field sheet along with the appropriate units (e.g. $^{o}$C, mS, µS,).

- BANK SAMPLE: measure directly from river edge
- BRIDGE SAMPLE: If you have an Oakton meter with a 100' probe, measure the parameters directly in the river at the center of the channel. If not, use the following procedure: after pouring off the sample use excess water from the 3L PFA bottle for the field measurements; rinse the probe and plastic container with water from the 3L bottle before pouring another portion into the measuring container. Measure water parameters immediately after pouring off the sample so that conditions (temperature) do not change
- Flow and stage fields will be completed in the lab by getting information from CDEC or USGS web sites; please note source, date of receiving the information and your initials on the field sheet

At the end of the day fill the electrode storage cap with electrode storage solution before placing the meter in its case.

Recalibrate the Oakton pH/conductivity/temp meters once per month. Record recalibration date on a piece of labeling tap and affix to the inside panel of the meter case.

Note anything significant or unusual under Observations on the field sheet; for example waste disposal, irrigation runoff, foam on water surface, dead fish, etc.

Original field sheets stay with UC Davis in a prepared folder at the IOE.

# **4**. How to collect a sample

*Always wear clean gloves during sampling procedure!*

BANK
a) Using bungee cord, affix 1L amber glass bottle to sampling pole
b) Check to insure the bottle is secure

c) Remove the cap (wear clean glove!)
d) Immerse the bottle until bubbles stop. Fill completely; do not leave any headspace
e) Replace the cap (still wearing the clean glove!)
f) Rinse the outside of the bottle with deionized water
g) Slip the bottle into a protective sleeve
h) Place sample directly into a cooler (up to 15 1L bottles can be placed in one cooler). Make sure there is no glass-to-glass contact

BRIDGE SAMPLE

1. Put on your orange safety vest. Always be aware of traffic and use caution while sampling from a bridge
2. At the van, put the 3L PFA bottle into the TECHMA cage, secure it with the bungee cord (you will loose the bottle, if the bungee cord is not strapped around the bottle!), and remove the cap
3. Wearing leather gloves carefully lower the bottle from the bridge railing to the water surface. Do not lower too fast or the bottle may be propelled from the cage upon impact. Perform a triple rinse with native water. Fill the bottle at least ¼ full for each rinse
4. To collect the sample, fill the bottle 1/4$^{th}$ at each of three equally spaced verticals (submerge for about 3-5 seconds), being careful to avoid contact between the bottle and anything but river water, especially when moving between verticals
5. Return to the van
6. Remove the 3L bottle from the TECHMA cage and swirl the water until completely mixed
7. The second person has already labeled the sample bottle. While wearing clean gloves the second person removes the bottle cap and holds the sample bottle as the sampler pours from the 3L PFA bottle into the sample bottle. After the sample bottle is completely filled the second person then recaps the sample bottle
8. Rinse the outside of the sample bottle with deionized water, place the bottle in a protective sleeve and store it in the cooler.

The last thing to do before filling any amber glass sample bottle, regardless of method, is to remove the lid. The first thing to do after filling any amber glass sample bottle, regardless of method, is to replace the lid. If you have more than one sample bottle to fill, remove each lid just prior to filling the bottle

Clean the 3L bottle after sampling with the following procedure:

- While wearing gloves, add 10% Liquinox soap mixture (2-3 squeezes) and approximately 50ml of deionized water to the PFA bottle. Place the cap on the bottle and swirl the soap around inside the bottle until the entire inside surface has been covered with suds. Un-cap

the bottle and pour the soap onto the ground. Rinse the bottle and cap using deionized water until no suds remain inside the bottle or on the cap

- Pour 5-10ml of methanol into the bottle and swirl, with the cap on, until methanol has covered the entire inside surface of the bottle. Carefully pour the waste methanol into the methanol waste container. Seal the methanol bottle and waste container with Parafilm to prevent fume leakage. *Methanol is dangerous—do not inhale or touch!*

The 3L bottle is ready for the next sampling and should be stored, with the cap on, inside the TECHMA cage

## **5.** If scheduled collect a quality control sample

View the QC Schedule to find out which type of QC sample you should collect that day

***-- Field duplicate:***

a) Collect both samples simultaneously. If using a pole sampler place two bottles in the sampler. If using the TECHMA fill the 3L PFA bottle with enough water for both the environmental and duplicate samples
b) Mark the sampling time of the duplicate sample by adding **3 minutes** to the time of the environmental sample (e.g. environmental sample collected at 14:00 then duplicate time is 14:03). **Do not** indicate *duplicate* on the label or on the COC!

***-- Matrix Spike:***

Collect **TWO** bottles of water; one for the matrix spike (MS) and one for the matrix spike duplicate (MSD). For both samples add **9 minutes** to the time of the environmental sample (e.g. environmental sample collected at 14:00 then spike time is 14:09) and mark as "matrix spike" on the **COC** *and* **label**. It should be made obvious so that the lab knows that this sample needs to be spiked. The MSD will be labeled exactly the same as the MS.

BRIDGE SAMPLE

a) From the single 3L PFA filled using the procedure above pour the collected water into two 1L bottles; one for the environmental sample and one for the matrix spike.

BANK SAMPLE

b) Fill two 1L bottles with one reach of the pole sampler; one for the environmental sample and one for the matrix spike.

***-- Blank sample:***

**Do not** indicate blank on label or on COC. Time offset: add **1 minute** to the time of the environmental sample (e.g. environmental sample collected at 14:00 then blank time is 14:01).

BRIDGE SAMPLE

*BEFORE TAKING ENVIRONMENTAL SAMPLE:*

a) Rinse the clean 3L PFA bottle three times with deionized water (approximately 50ml for each rinse)
b) Fill the 3L bottle 2/3 full with deionized water and pour into a 1L bottle for the blank

BANK SAMPLE

Fill one 1L bottle with deionized water for the blank

Whoever did not fill out the field sheet and COC should double check all of the recorded times for completeness and error at the end of the sampling day

### Check ice level

The temperature of the ice chest should be around 4°C. Make sure to add ice if necessary.

## 6. Deliver samples within 48 hours

**Samples need to be dropped of at:**

- **(1-L amber glass bottles)**
  California Department of Fish and Game, Fish and Wildlife Water Pollution Control Laboratory, 2005 Nimbus Road, Rancho Cordova, CA. Responsible Person: Loc Nguyen, Lnguyen@OSPR.DFG.CA.GOV *open from 8 am to 5 pm* after hours call Loc Nguyen (916) 358-2010 or Abdou Mekebri 916 358-4396.
  No drop off on weekends or on holidays unless pre-arranged! (For storage in our facility or somewhere else over the weekend make sure that there is enough ice in the cooler and the temperature stays at 4 degrees C)

## 7. Complete Chain of Custody form

- The original COCs will stay in the CDFG Lab. Have Loc Nguyen (or other recipient) make you a copy of the COC. Sample transfer between field staff and laboratory is documented by **signing and dating** "relinquished by" and "received by" blocks whenever sample possession changes. The document must have both yours **and** the lab's signature.